ORDER

6300.12

PROJECT IMPLEMENTATION PLAN (PIP)

FIXED GROUND ANTENNA RADOME (FGAR)

Including Tower Retrofit Modification

January 14, 1991

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

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Initiated By: ANR-110

RECORD OF CHANGES

DIRECTIVE NO. 6300.12

CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL USE	CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL USE

GPO : 1968 OF—308-383

FOREWORD

This order serves as both program management plan (PMP) and a project implementation plan (PIP). It provides management direction for the implementation and acceptance of the Fixed Ground Antenna Radome (FGAR) National Airspace System (NAS) and defines the major functional responsibility levels, management direction, and overall program guidance to all responsible levels within the FAA for the procurement and implementation of FGAR including the Tower Retrofit Project.

Carey L. Weigel
Program Director for Surveillance

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CHAPTER 1. GENERAL

1. PURPOSE. This order serves both as a Program Management Plan (PMP) as well as a Project Implementation Plan (PIP). It provides technical guidance and direction for implementing the Fixed Ground Antenna Radome (FGAR) into the National Airspace System (NAS). It also includes implementing plans for the Tower Retrofit Project.

2. DISTRIBUTION. This order is distributed to director level for the office of the Associate Administrator for NAS Development, Administration, Airport Safety and Standards, Air Traffic, Aviation Standards, and the Assistant Administrator for Policy and International Aviation; division level to the Office of Flight Standards, Chief Counsel, Human Resources Development, Budget, Civil Aviation Security, Aviation Policy and Plans, Aviation Standards National Field Office, Program and Resources Management, and Personnel; branch level for the NAS Transition and Implementation Service, Logistics Service, Air Traffic Plans and Requirements Service, Systems Maintenance Service, and the Program Director for Surveillance; branch level to the regional Airway Facilities Division; branch level to the Facility Support Division at the Aeronautical Center and the Evaluation Staff at the FAA Technical Center; limited distribution for the Air Traffic and Airway Facilities field and sector offices.

3. AUTHORITY TO CHANGE THIS ORDER. The Program Director for Surveillance, ANR-1, shall approve all changes to this order.

4.-19. RESERVED.

CHAPTER 2. PROJECT OVERVIEW

20. SYNOPSIS. As a result of the FAA's program to implement Mode-S, some existing long-range radar radomes could not accommodate the additional space required by the new Mode-S antennas. A new project ensued to provide larger radar radomes. This project consists of procuring the equipment specified in Specification for Fixed Ground Antenna Radome, FAA-E-2773, and installing and integrating it into the NAS. At most of the locations, the larger radome cannot be accommodated without strengthening the existing radar tower to withstand additional loading. A select group of radar towers shall be strengthened as site preparation (Tower Retrofit Project) before the FGAR project is implemented.

21. PURPOSE. The purpose of the this project is to provide new and larger radomes for L band long-range radars that require collocated Mode-S installations. Radomes shall be procured by the use of a performance specification that establishes the requirements for performance, design, and acceptance of a state-of-the-art radome providing environmental protection for sophisticated L-band antenna systems. The radome shall be mounted on a fixed-ground antenna tower. It shall provide an environmental enclosure for any of a variety of single or dual faced monopulse beacon phased array and en route surveillance radar installations. Installations will be comprised of an installation mix ranging from beacon-only-sites (BOS) to collocated beacon and search radar sites. The radome shall be entirely nonmetallic (except for fasteners), oblate spheroid or spherically shaped and attached at the base to the tower platform.

22. HISTORY.

a. This project is an outgrowth of the Mode-S establishment program. Many present en route radar radomes are not large enough to accommodate the proposed Mode-S antennas and these radomes are required prior to the Mode-S establishment.

b. A new specification FAA-E-2773 was baselined, project budgeted, and procurement effort was begun in 1988 for larger radomes.

c. The DOT Transportation Systems Center (TSC) was tasked by FAA to study the additional loading effects that the proposed replacement radomes, at Mode-S en route locations, would have on the tower structures.

23.-29. RESERVED.

CHAPTER 3. PROJECT DESCRIPTION

30. FUNCTIONAL DESCRIPTION. The FGAR project shall consist of the following:

a. Equipment Design and Production. The contractor shall design, develop, produce, and install the radome, its associated support equipment, including the radome mounting ring for the Type II radome, and spare parts as described in the following subparagraphs. All hardware, including the hardware used for the installation, cables, and wires necessary to connect the radome to the radome mounting ring, the support equipment, other radome mounted/supported equipment, and to the primary power shall be provided by the contractor.

b. Radome, Type I. This type of radome shall provide an environmental enclosure for a collocated L band radar parabolic reflector and top-mounted dual faced L band beacon phased array. The radome shall be capable of withstanding wind velocities of 150 miles per hour (mph) with 30 percent gust overload, shall have an inside diameter of 59 feet at its widest point, and shall fit a base ring diameter equal to that of the present CW-396A radome. The enclosed antennas will rotate at a speed of either five or six revolutions per minute (RPM).

c. Radome, Type II. This type of radome shall provide an environmental enclosure for a dual faced L band beacon phased array consisting of two identical rectangular back-to-back antennas approximately 6 feet high by 26 feet in width, rotating at speeds up to 5 RPM. The radome shall be capable of withstanding wind velocities of 150 mph with 30 percent gust overload, shall have an inside diameter of 35 feet at its widest point, and shall fit the standard beacon-only antenna platform without requiring platform modification.

d. Radome, Type III. This type of radome shall be identical to Type I in all respects except that it shall be capable of withstanding wind velocities of 100 mph maximum with 30 percent gust overload.

e. Radome, Type V. This type of radome shall provide an environmental enclosure for a collocated L band radar reflector and top-mounted dual faced L band beacon phased array. The radome shall be capable of withstanding wind velocities of 150 mph with 30 percent gust overload, shall have an inside diameter of 57.5 feet at its widest point, and shall fit a base ring diameter equal to that of the present ARSR-3 ESSCO model M57-86-6000 radome.

f. Radome, Type VI. This type of radome shall be identical to Type V in all respects except that it shall be capable of withstanding wind velocities of 100 mph maximum with 30 percent gust overload.

g. Radome Support Equipment. The contractor shall design and produce the support equipment as defined and specified in FAA-E-2773. The quantities, shipping destinations, and delivery schedules shall be as stated in the contract.

h. FGAR Remote Maintenance Subsystem (RMS). The FGAR accommodates RMS function which will monitor environmental functions. The direct interface with the FGAR demarcation point will be an Environmental Remote Maintenance Subsystem (ERMS) planned for the radar site.

31. PHYSICAL DESCRIPTION. Each radome shall be complete and in conformance with all specified requirements, and shall include, but is not limited to, the following items:

a. Radome (with airlock and equipment hatch(s) as necessary).

b. Lightning protection assembly.

c. Aircraft obstruction light assembly.

d. Repair kit and maintenance items.

e. Ancillary equipment.

f. Zenith hatch assembly.

g. Service hatch.

h. Catwalk access hatch.

i. Interior safety ladder.

j. Interior block and tackle assembly.

k. Crown vents with remote actuation provisions via a Remote Maintenance Monitoring System (RMMS).

l. Snow rope.

32. SYSTEM REQUIREMENTS. System requirements include power, reliability, and environmental considerations.

a. Power Requirements. If the radomes are procured as rigid types then a two-lamp aircraft obstruction light assembly shall be provided as an integral part of the radome zenith hatch assemblies rigid crown plate with a flexible 120 VAC power lead. The power lead will be attached to the interior wall of the radome and to the radome base with 30 feet of additional cable for connection to the Government's electrical system. The assembly shall be provided in conformance with, AC 150/5345-43C, Specification For Obstruction Lighting Equipment and meet the radome equipment specification that all existing radar/beacon radomes and BOS towers currently equipped with aircraft obstruction lights, shall receive new aircraft obstruction lights as part of this radome procurement. The new aircraft obstruction lights shall be the redundant (two-lamp), type L-810 and shall meet all the requirements of AC 150/5345-43C. There shall be provisions for remote maintenance monitoring of the obstruction lights. Monitoring shall be done in such a manner that the radio-frequency (rf) radiation requirements are not deteriorated. Monitor leads shall be routed to the separate RMMS demarcation point in the radar equipment room. Installation of the obstruction lights on the radome will depend upon the results of an airspace study, as each location may or may not require obstruction lights. If inflatable radomes are procured, power requirements will include power interfaces for pumps and de-inflation safety devices (these are not known at this writing).

b. Radome Reliability. The mean time between critical failure (MTBCF) of the radome shell shall be a minimum of 175,200 hours. The radome shell MTBCF does not include factors that are external to the radome shell such as Government furnished ancillary equipment failure or intentional or accidental damage. It does mean any malfunction that either impedes the rotation of the radar antennas or exposes those antennas to the weather or elements. For an inflatable radome, any inflation mechanisms or equipment that maintains the radome internal pressure at the contractor specified level required to properly inflate the radome shall have a MTBCF of at least 8,750 hours, the radome shell MTBCF in the event of such failure shall be a minimum of 720 hours. The 720 hours will allow sufficient time for corrective maintenance to occur before inflating the radome again.

c. Environmental Considerations. Environmental considerations include the functional requirements specified in paragraphs 30a-f as well as other site unique and weather related influences. The requirements for a radar site that experiences very high winds (e.g., is located at the top of a mountain within the jet stream versus one that is at sea level and does not experience extreme ice loading) will require different environmental considerations.

33. INTERFACES. The radome to radar antenna tower interface is both physical and electrical.

a. Physical Interface. The radome shall be attached physically to the antenna tower by a radome mounting ring. Type I and type III radomes shall fit the present CW-396A radome base ring. Type V and VI radomes shall fit the present ARSR-3 ESSCO model M57-86-6000 radome base ring. Dimensions are given in Washington Standard Drawing Series D-5548, 5982, and 5983. Type II radomes shall fit the standard beacon-only antenna platform. Dimensions are given in Washington Standard Drawing Series D-6083 through 6085.

b. Electrical Interface. The radome assembly shall be electrically interfaced with the radar electrical distribution system, with the lightning protection system and aircraft obstruction lights, access hatches, and all ancillary devices or units necessary for radome operation and maintenance.

(1) Primary Power. The radome ancillary equipment shall normally operate from a commercial prime power source of three-phase, four-wire AC, Line. The design center voltages shall be 208 volts, 60 Hz phase-to-phase and 120 volts phase-to-neutral with a maximum voltage range allowance $\pm$15 percent. In case of failure of the prime power source, power from an auxiliary engine-generator source (not a part of this specification) will be automatically connected to furnish power to the equipment within 15 seconds. Prior to switching to auxiliary power, the remnants of commercial power (e.g., two phases remain connected and one phase is lost) normally remain connected to the radar system.

(2) Load Protection. Instantaneous overvoltage (e.g., crowbar type circuitry) shall be provided on all power supplies used to drive voltage-critical devices. There shall be no transients or surges at turn-on, or upon restoration of power following a power loss, that could cause equipment failures or circuit breakers to trip. The equipment shall automatically disconnect the voltage from circuits which would be damaged by loss of, or deviation from, its normal value of voltage.

(3) Remote Maintenance Monitoring System. Various portions of the radome shall have sensing circuits to allow remote monitoring and control. All signals needed for this shall be routed to a separate demarcation point in the radar equipment room as part of the Remote Control Interface Unit functions. As a minimum, depending what type of technology is used, obstruction lights and intrusion will be two monitored functions.

34. RADOME LIGHTNING PROTECTION. Lightning protection for the new radomes will be provided in accordance with the equipment specification, Specification for Fixed Ground Antenna Radome, FAA-E-2773.

35.-39. RESERVED.

CHAPTER 4. PROJECT SCHEDULE AND STATUS

40. PROJECT SCHEDULES AND GENERAL STATUS. The first group of tower modifications will be performed in preparation for the delivery and installation of the new and larger radomes on a "as required basis." This action followed by an initial radome procurement of 25 will fulfill FY-87, 88, 89, 90 and FY-91 requirements. The 25 radome replacement will be initially delivered to the FAA under the provisions of request for proposals DTFA01-88-R-06648 with options for addition units and training. Eighty-four additional locations will be scheduled to fulfill future requirements.

41. MILESTONE SUMMARY SCHEDULE. The current project schedule is shown in table 4-1. Project events are scheduled in relationship to the date of contract award. The dates listed are for those milestones completed or anticipated. This table is by no means an all inclusive list of project milestones necessary for project completion.

TABLE 4-1. MILESTONE SUMMARY SCHEDULE

EVENT	ESTIMATED DATES (MO) after contract award
Contract Award Estimated	t = 10/91 (est.)
Master Test Plan Approved	t+3
Shakedown Test Plan/Procedure Approved	t+4
OT&E/Integration Test Plan Approval	t+4
First System Delivery to T&E Site	t+9
Finish System Integration & Checkout	t+10
Finish Integration & Shakedown Tests	t+10
First System Delivery 1st Site	t+12
Last System Delivery Last Site	t+24
FAA Logistics Center Deliveries Complete	t+25

42. INTERDEPENDENCIES AND SEQUENCE. The following two projects were identified as having interdependencies with this project.

a. En Route Tower Retrofit Project.

(1) Background. The radomes being procured for the Beacon Only Site (BOS), FPS-20 and ARSR-1/2 en route radar sites have a larger diameter than the ones presently installed. Therefore, the various radome supporting structures have been analyzed to determine if they are capable of withstanding the additional loading produced by a larger radome. A structure analysis has been done by the Transportation Systems Center (TSC). The analysis showed the BOS and ARSR-1/2 towers will be over stressed at various points by the additional load. From the analysis of the ARSR-1/2 towers, TSC has produced a design for ANR-110 which will allow these towers to be strengthened in an operational environment. BOS tower analysis and design is being managed by ANS-200. The tower design has not yet been completed but will be provided.

(2) Implementation. The En Route/Special Projects Associate Program Manager for Engineering, ANR-110, will provide the schedule, funding, and a design for each general tower type to be modified. The responsibility for accomplishing the tower retrofit is the responsibility of each regional office. The following chart summarizes the overall project:

Table 4-2. RADOMES/TOWER RETROFIT

Radomes Planned	Towers to be Retrofitted
25 Basic Buy	17 Basic Buy
10 First Option	7 First Option
74 Second Option	40 Second Option

(3) Schedule. The retrofit of towers will begin in the spring of 1991. Based on the projected radome delivery schedule, all towers in the basic buy but needing a retrofit should be completed by September 1992. Schedule requirements for towers in the first and second options are unknown at this time. The availability of funding will dictate when the first and second options are exercised. The following lists, by region, the towers needing a retrofit and the radome procurement option they fall under.

TABLE 4-3. EN ROUTE TOWER
RETROFIT SITES
(BASIC BUY, 1ST OPTION, 2ND OPTION)

NORTHWEST MOUNTAIN REGION

RADAR SITE	TOWER TYPE	TOWER HEIGHT
(BASIC BUY)		
Cedar City, UT	ARSR-1/2	50ft
Grand Junction, CO	ARSR-1/2	25ft
Francis Peak, UT	ARSR-1/2	50ft
Rock Springs, WY	ARSR-1/2	25ft
Ashton, ID	ARSR-1/2	50ft
Lovell, WY	ARSR-1/2	25ft
Lusk, WY	ARSR-1/2	25ft
Parker, CO	ARSR-1/2	25ft
Cascade, ID	ARSR-1/2	25ft
Trinidad, CO	ARSR-1/2	25ft
(1ST OPTION)		
NONE		
(2ND OPTION)		
Seattle, WA	ARSR-1/2	75ft
Aspen, CO	ASR-8	27ft
Eagle, CO	ASR-8	77ft

WESTERN-PACIFIC REGION

RADAR SITE	TOWER TYPE	TOWER HEIGHT
(BASIC BUY)		
Battle Mountain, NV	ARSR-1/2	75ft
Angle Peak, NV	199A	25ft
Tonopah, NV	FPS-7	25ft
Fallon, NV	FPS-35	85ft
Red Bluff, CA	199A	27ft
(1ST OPTION)		
Boron, CA	FPS-35	85ft
(2ND OPTION)		
San Pedro, CA	ARSR-1/2	50ft
Pohoa, HI	ASR-8	47ft
Puu Nianiau, HI	ASR-8	47ft
Santa Rose, Guam	AB-199	23ft
Sacramento, CA	AB-563	36ft
Seligman, AZ	ARSR-3	50ft

SOUTHWEST REGION

RADAR SITE	TOWER TYPE	TOWER HEIGHT
(BASIC BUY)		
Mesa Rica, NM	ARSR-1/2	50ft
Gallup, NM	ARSR-1/2	75ft
Amarillo, TX	199A	24ft
(1ST OPTION)		
Texarkana, AR	ARSR-1/2	75ft
West Mesa, NM	199A	28ft
Oklahoma City, OK	AB-563	50ft
(2ND OPTION)		
Silver City, NM	ARSR-1/2	25ft
Rogers, TX	ARSR-1/2	50ft
Fort Worth, TX	ARSR-1/2	50ft
Anson, TX	ASR-8	67ft
Chelsa, OK	ASR-8	67ft
Alexandria, LA	AB-563	60ft
Russelville, AR	AB-564	50ft
Arbuckle, OK	ARSR-3	50ft
San Antonio, TX	AB-199	28ft

CENTRAL REGION

RADAR SITE	TOWER TYPE	TOWER HEIGHT
(BASIC BUY)		
Garden City, KS	ARSR-1/2	25ft
North Platte, NE	ARSR-1/2	50ft
Rockville, NE	ASR-8	37ft
(1ST OPTION)		
NONE		
(2ND OPTION)		
Oskaloosa, KS	ARSR-1/2	25ft
St Louis, MO	ARSR-1/2	50ft
Crocker, MO	ASR-8	67ft
Hutchinson, KS	AB-199	50ft
Omaha, NE	AB-199	25ft
Arlington, IA	ARSR-3	38ft
Kirksville, MO	ARSR-3	37ft

GREAT LAKES REGION

RADAR SITE	TOWER TYPE	TOWER HEIGHT
(BASIC BUY)		
Tyler, MN	ARSR-1/2	50ft
Gettysburg, SD	FPS-27	80ft
(1ST OPTION)		
London, OH	ARSR-1/2	75ft
Brecksville, OH	ARSR-1/2	75ft
Detroit, MI	ARSR-1/2	47ft
LaGrange, IN	ARSR-1/2	50ft
Indianapolis, IN	ARSR-1/2	55ft
(2ND OPTION)		
Apple Valley, MN	ARSR-1/2	25ft
Horicon, WI	ARSR-1/2	50ft
Eagle River, WI	ASR-8	70ft
Huntingburg, IN	ASR-8	77ft
Coopersville, MI	ARSR-1/2	75ft
Hanna City, IL	AB-563	24ft
Joliet, IL	ARSR-3	50ft
Port Austin, MI		
Camlet, MI		

NEW ENGLAND REGION

RADAR SITE	TOWER TYPE	TOWER HEIGHT
(BASIC BUY)		
St Albans, VT	FPS-7	45ft
(1ST OPTION)		
NONE		
(2ND OPTION)		
Cummington, MA	ARSR-1/2	50ft
Skowhegan, ME	ASR-8	57ft

SOUTHERN REGION

RADAR SITE	TOWER TYPE	TOWER HEIGHT
(BASIC BUY)		
NONE		
(1ST OPTION)		
Marietta, GA	ARSR-1/2	70ft
(2ND OPTION)		
Citronelle, AL	ARSR-1/2	50ft
Lynch, KY	ARSR-1/2	92ft
Benson, NC	ARSR-1/2	50ft
Maiden, NC	ARSR-1/2	50ft
Byhalia, MS	ARSR-1/2	25ft
Montgomery, AL	ARSR-1/2	60ft
Joelton, TN	ARSR-1/2	25ft
Ashburn, GA	ARSR-1/2	50ft
Samburg, TN	ASR-8	77ft
Grand Turk, BWI	ASR-8	47ft
Haleyville, AL	ARSR-1/2	65ft
Crossville, TN	ASR-8	90ft
Pico Del Este, PR	BLDG	45ft
Key West, FL	AB-563	73ft
Newport, MS	ARSR-3	50ft
Lincolnton, GA	ARSR-3	67ft

EASTERN REGION

RADAR SITE	TOWER TYPE	TOWER HEIGHT
(BASIC BUY)		
NONE		
(1ST OPTION)		
NONE		
(2ND OPTION)		
Dansville, NY	ARSR-1/2	50ft
Higby, WV	ASR-8	37ft
Trevose, PA	ARSR-1/2	75ft
Benton, PA	FPS-35	85ft
Oakdale, PA	FPS-24	80ft
Clearfield, PA	ARSR-3	75ft
The Plains, VA	ARSR-3	75ft
Binns Hall, VA	ARSR-3	75ft
Bedford, VA	ARSR-3	50ft

ALASKA REGION

RADAR SITE	TOWER TYPE	TOWER HEIGHT
(BASIC BUY)		
NONE		
(1ST OPTION)		
NONE		
(2ND OPTION)		
Murphy Dome, AL	AB-563	35ft
Biorka Island, AL	ASR-8	47ft
Dead Horse, AL	ASR-8	65ft
St Paul Island, AL	ASR-8	17ft
Middleton Island, AL	ASR-8	75ft
Kenai, AL	ARSR-3	92ft
Yakutat, AL		

OTHER

RADAR SITE	TOWER TYPE	TOWER HEIGHT
FAA Academy	ARSR-1/2	

b. Mode-S Antenna Installation. This project is part of the Mode-S Program. This project must be conducted following the tower strengthening and this radome project.

43.-49. RESERVED.

CHAPTER 5. PROJECT MANAGEMENT

50. PROJECT MANAGEMENT, GENERAL. This chapter describes the organizations within the Surveillance Engineering Program (ANR) that are directly responsible for Radome program management.

a. Surveillance Engineering Program (ANR). The Surveillance Engineering Program manages, directs, and executes the FAA's engineering and management activities related to Surveillance equipment and facilities design and to ensure that the NAS is efficient, economical, and responsive to operational needs.

b. Division Manager for Surveillance Engineering (ANR-100). This is the principal element of the program responsible for the design, development, and implementation of systems, programs, and facilities requirements for Surveillance Engineering.

c. En Route/Special Projects Associate Program Manager for Engineering (ANR-110). This is the principal element of the division responsible for design, development, and implementation responsibilities for en route and special radar projects.

d. Radome Project Manager. The Radome Project Manager is supported by engineering and is responsible for managing the design, development, and implementation activities associated with the radomes. His/her duties include:

(1) Management. Planning, scheduling, and managing the program from design through commissioning, logistics support, training, and program completion. Responsible for systems engineering, system design, man-machine interface, component design and related functional, technical, and performance characteristics.

(2) Logistic Support. Directs the Associate Program Manager for Logistics (APML), through the matrix management concept, to provide the technical guidance to define the logistics support requirements for proper logistics management and support of the radomes. The FGAR National Airspace Integrated Logistics Support Management Team (NAILSMT) will be the mechanism through which the logistics support requirements are identified and developed and the NAILSMT will be chaired by the APML. Logistics element managers, working with the APML through the NAILSMT will identify requirements related to technical data and manuals, training, supply support, facilities, test equipment, packaging, handling, storage and transport-

ability, and other logistics support requirements as required.

(3) Modernization Input. Developing service input for the modernization or in-service improvement of equipment.

(4) Technical Officer. Providing engineering advice and consultation to contracting officer during procurement, serving as technical officer, and reviewing contractor requests and progress payments.

(5) Cost Data. Developing and providing cost data, controlling assigned funds, and adjusting program schedules and objectives as necessary.

(6) Technical Installation Instructions. Preparing technical installation instructions.

(7) Testing. Reviews and approves manufacturers' equipment test procedures. Establishes requirements and approves plans for test and evaluation of engineering activities of the FAA Technical Center.

(8) Inventory. Manages in-transit material for construction and installation. Maintains currency of material systems and control over equipment inventory.

(9) Installation. Management of installation activities for current and future systems to assure a high level of system performance.

(10) Acceptance. Providing research, engineering, development, design and systems analyses associated with acquisition and acceptance of hardware and software.

51. PROJECT CONTACTS. This paragraph lists radome project contacts and their office, routing symbol, and telephone number.

a. Program Director. Carey L. Weigel, ANR-1, Federal Aviation Administration, 800 Independence Avenue, S.W., Washington, D.C., 20591, FTS 267-8227, (202) 267-8227.

b. Program Manager. Don Johnson, ANR-110, Federal Aviation Administration, 800 Independence Avenue, S.W., Washington, D.C., 20591, FTS 267-8421, (202) 267-8421.

c. Technical Officer. Mike Huffman, ANR-110, Federal Aviation Administration, 800 Independence Avenue, S.W., Washington, D.C., 20591, FTS 267-8421, (202) 267-8421.

d. Contracting Officer. Micheline Conn, ALG-320, Federal Aviation Administration, 800 Independence Avenue, S.W., Washington, D.C., 20591, FTS 267-3645, (202) 267-3645.

e. Materiel Management. Billy Holland, ANR-110, Federal Aviation Administration, 800 Independence Avenue, S.W., Washington, D.C., 20591, FTS 267-8422, (202) 267-8422.

f. FAA Regional AF Liaisons. Listed below are the FAA regional liaison contacts who will further coordinate with the regional Project Material Managers and AF sectors.

Routing Symbol	Office /Contact	Telephone Number
ACE-425	F&E Planning	816-426-5676
AEA-421	Resources & Planning	718-917-1176
AGL-422	F&E Planning	312-694-7468
ASO-422	Plans & Programs James B. Garrett	404-763-7371
ANE-422	Plans & Programming	617-273-7211
ANM-421	Program & Planning	206-431-2420
AWP-422	F&E Program	213-297-0036
ASW-421	Program & Planning	817-624-5424
AAL-421	F&E Planning	907-271-5829

52. PROJECT COORDINATION. The FGAR project requires coordination with other services within the FAA, with regional representatives, and with the contractor onsite representatives during installation. Coordination by and with the organizations listed under paragraph 52 is essential for them to efficiently accomplish their functions.

a. Maintenance Engineering Division (ASM-100). ASM-100 reviews procurement specifications to ensure the design meets the reliability and maintainability requirements and supports the general maintenance philosophy. ASM-100 also coordinates the development of an integrated logistic support plan for the FGAR system acquisition and develops maintenance standards and plans for implementation of maintenance concepts.

b. National Airway Engineering Field Support Division (ASM-600). ASM-600 is responsible for providing direct engineering support to field facilities and will provide shakedown testing for the FGAR project as required; identifies problems and develops and tests modifications as required to bring equipment/systems to a commissioned status. Maintains the NAS baseline configuration and reviews specifications, contracts, procurement requests to assure compliance with maintenance concept and requirements.

c. Maintenance Operations Division (ASM-200). ASM-200 participates in the development and review of maintenance plans. In addition, ASM-200 develops national Airway Facilities sector staffing standards for the program and validates maintenance staffing requirements. The program manager ensures the project is in conformance with staffing, training, certification policies, guidelines, and requirements.

d. NAS Support Division (ALG-200). ALG-200 develops, recommends, and issues agency systems, procedures, standards, and policies for material, supply, and property management.

e. Contracts Division (ALG-300). ALG-300 performs cost/price analyses of contractor's proposals and participates as a member of the Source Evaluation Board on FGAR procurement subject to the contracting officer (CO). In addition, ALG-300 provides procurement support for the FGAR programs and plans, and places, and administers contracts for the FGAR equipment. ALG-300 also designates a CO who is responsible for all contractual matters. The CO is the only individual authorized to approve contract changes impacting price, delivery, or schedule.

f. Industrial Division (ALG-400). ALG-400 performs factory inspection of the FGAR. ALG-400 assigns a quality/reliability officer (QRO) at the time the contract is awarded. The QRO is the FAA's representative at the contractor's facility and is responsible for verifying quality control. The QRO is directed by FAA policy and procedure, and by the terms and conditions of the contract.

g. FAA Logistics Center (AAC-400). AAC-400 accepts deliveries of FGAR systems from the manufacturer and manages the dissemination of FGAR systems at the regions request. AAC-400 is responsible for logistics support.

h. NAILS Program Division (ANS-400). ANS-400 develops the required logistics policies, plans, and standards required to support the National Airspace Integrated Logistics Support (NAILS) process.

i. FAA Logistics Center (AAC-400). AAC-400 accepts deliveries of FGAR systems from the manufacturer and manages the dissemination of FGAR systems at the regions request. AAC-400 is responsible for logistics support.

j. FAA Academy (AAC-900). AAC-900 provides maintenance training and coordinates with ASM-200 in the development of a training plan. A system user guide will be provided for the training of air traffic personnel.

k. Technical Training Division (AHT-400). AHT-400 analyzes training proposals prepared by ASM-200 and initiates action to meet training requirements in a timely manner.

l. FAA Aviation Standards National Field Office. The FAA Aviation Standards National Field Office is responsible for providing the coordination to accomplish their following functions:

(1) Providing the support necessary for accomplishing the preliminary (preparatory) and commissioning flight inspections, as required.

(2) Determining if the operational status of a facility or system is in accordance with the established tolerances.

(3) Certifying the facility or system for operational use in the NAS when all operational requirements have been met.

(4) When applicable, ensuring that required Notices to Airmen (NOTAM) are issued for any facility or system restriction.

m. FAA Regional Offices. The FAA regional offices through established administrative structures coordinate with all responsible parties to assure adequate funding, establish system commissioning/service availability dates, assign project field representatives and determine utility availability for the FGAR system. The regions will be responsible for preparing all radar towers requiring strengthening in a timely manner to accept delivery of the replacement radomes. The regions also provide field engineering as required to support preparations for the installation of the FGAR system; order Government Furnished Materials (GFM) for tools and test instruments to support

installation and acceptance; tailor installation drawings to be site specific; initiate work orders and travel authorization; and assign field personnel. The following regional offices are responsible for accomplishing the following functions:

(1) Regional Airway Facilities Division.

(a) Installing facilities systems and equipment in accordance with established standards, specifications, and instructions.

(b) Notifying the appropriate sector that a project has been funded and issuing a projected implementation schedule.

(c) Providing the sector an opportunity to review and participate in project plans during the engineering phase and for furnishing the sector a copy of the engineering plans and contract documents.

(d) Providing the sector a copy of the project work order at least 10 days before the start of project work.

(e) Providing the appropriate facility reference data file (FRDF) information to the sector for inclusion in the FRDF.

(f) Providing the essential facility, system, and equipment technical reference and performance parameters as part of the project transmittal when maintenance technical handbook parameters are not available.

(g) Ensuring that all modifications, Configuration Control Documents (CCD), manufacturer's field changes, and factory changes are current and documented for equipment received from sources outside the Airway Facilities sector.

(h) Notifying the joint acceptance board chairman of when the facility will be ready for Joint Acceptance Inspection (JAI), providing the sector all data necessary to prepare warranty failure reports on items failing prior to JAI, and providing regional Airway Facilities division representatives for participation in the JAI.

(i) Establishing and maintaining a followup file for monitoring and clearing all JAI report exceptions, reviewing all JAI reports and followup reports for correctness, completeness, and proper distribution, taking appropriate and timely actions to clear JAI report exceptions, and identifying additional sources of funds or initiating budgetary action, as necessary, to clear exceptions.

(2) Airway Facilities Sector.

(a) Reviewing contract documents and engineering plans during the engineering phase and providing comments to the regional Airway Facilities division.

(b) Providing personnel as required at appropriate times throughout the project to witness and/or participate in construction, installation, tuneup, tests, and collection of technical reference data.

(c) Coordinating the release of equipment currently in use to regional Airway Facilities division establishment personnel for use in the project.

(d) Properly maintaining those components of an existing facility which are unaffected by an improvement project.

(e) Ensuring that modification/CCD's and documentation are current on installed equipment for the purpose for which the equipment was being used prior to the project.

(f) Providing a representative to serve as the joint acceptance board chairperson and other qualified personnel for participation in the JAI, preparing and distributing the JAI report, and assuming maintenance responsibilities and custodianship for facilities, systems, or equipment at the conclusion of JAI.

(g) Coordination and followup on exceptions after the JAI to include exceptions assigned to other organizations or to a contractor for clearance, clearing exceptions which have been assigned to the sector, reporting the clearance of exceptions, and reviewing all waived exceptions to determine if actions will impact sector operations or other organizations.

(h) Maintaining all equipment warranty information and reporting equipment failing under warranty.

(i) Receiving, storing, and shipping project materials and disposing of excess equipment and materials.

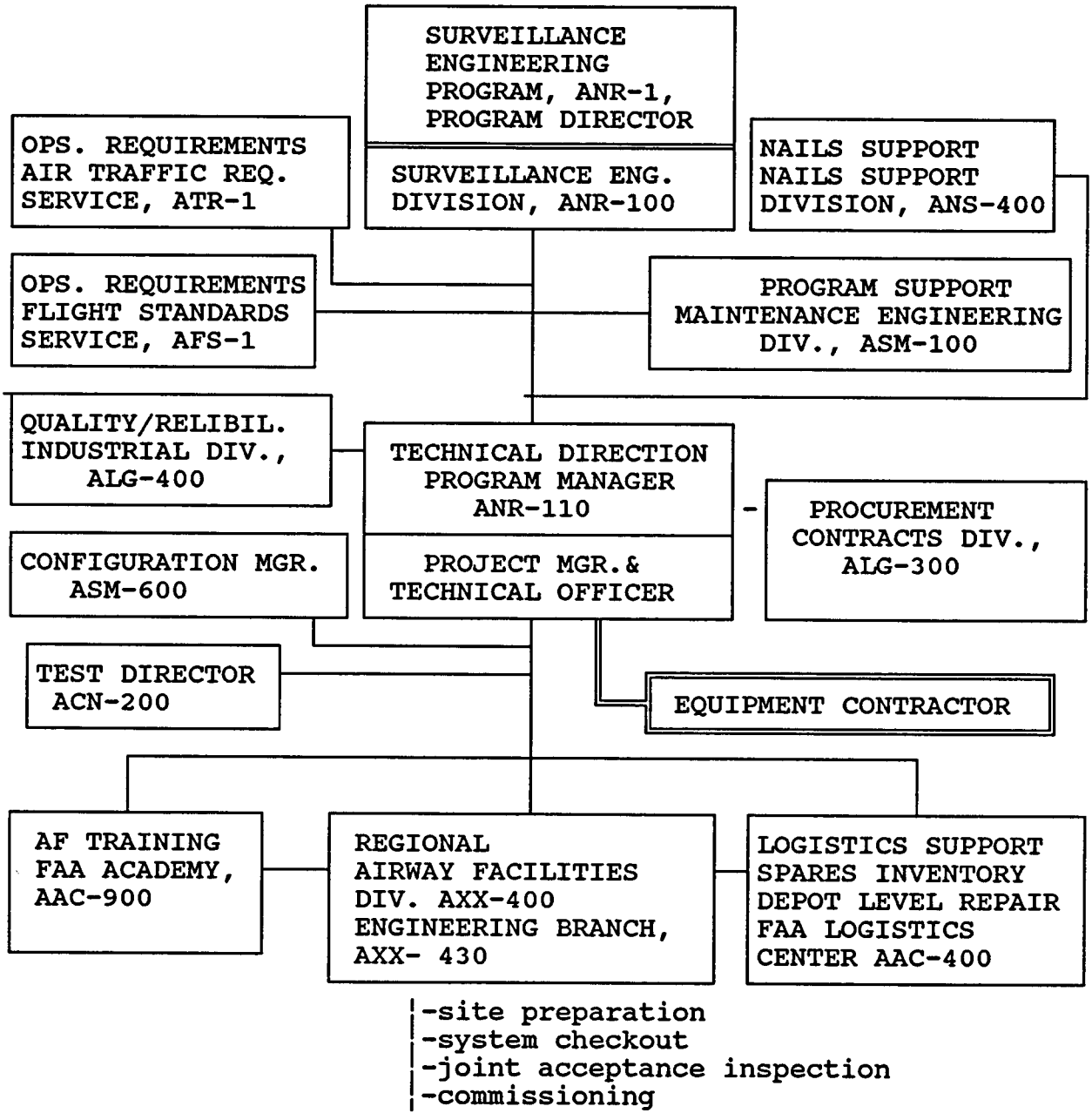
(3) Regional Logistics Division. Providing representatives to participate in specific projects which the regional Airway Facilities division has identified as having major logistical problems and has requested the participation by the regional Logistics division. Materiel Management Branch is the focal point for receipt of all documentation required for receiving, storing, shipping, and disposal of excess equipment and materials.

(4) Regional Flight Standards Division. Providing technical expertise to the regional Airway Facilities divisions, as required, for accomplishing JAI's and the commissioning of facilities and systems.

n. Contractor. The contractor will provide engineering support services for onsite advice, including technical guidance to FAA technicians and to his/her installation personnel concerning proper installation and operation of FGAR. Technical documentation required by the contract will normally be provided to the region to be included in the FRDF.

53. PROJECT RESPONSIBILITY MATRIX. Figure 5-1 illustrates the FAA organizations responsible for the implementation of each significant function of the FGAR project.

FIGURE 5-1. PROJECT RESPONSIBILITY CHART.



54. PROJECT MANAGERIAL COMMUNICATIONS. The FGAR Program Manager within ANR-110 is the focal point for all internal project communication. Organizations supporting the FGAR program designate a representative to maintain close communication with ANR-110. Supporting organizations maintain communications with both the contractor and internally within the FAA. The meetings listed in paragraph 54 are the regularly scheduled project meetings or conferences.

a. The National Airspace Integrated Logistics Support (NAILS) Meeting. These meetings are held to ensure that there is an interrelated, unified, and iterative approach to the managerial and technical activities which support the NAS. During these meetings issues effecting NAILS, logistics management, maintenance planning, equipment shakedown testing, supply support, test and support equipment, manpower and training support, support facilities, technical data, and packing, handling, storage, and transportation are discussed and resolved. The meetings are held on a semiannual basis at the FAA headquarters.

b. Program Director Status Review. These reviews are held on a bimonthly basis at FAA headquarters to discuss project status and to resolve problems and issues effecting all phases of the project from the time that the requirements are established until system deployment has been completed.

55. IMPLEMENTATION STAFFING. There are no personnel requirements peculiar to the implementation phase of the project.

56. PLANNING AND REPORTS. None required.

57. APPLICABLE DOCUMENTS. Within this PIP the following documents have been referenced:

a. Advisory Circular, AC 150/5345-49A, Specification L-854, Radio Control Equipment, August 8, 1986.

b. DOD-D-1000, Drawings, Engineering and Associated Lists.

c. DOD-STD-100, Engineering Drawing Practices.

d. FAA-D-2494b, Technical Instruction Book Manuscript: Electronic, Electrical, and Mechanical Equipment, Requirements for Preparation of Manuscript and Production of Books.

e. FAA-G-1375c, Spare Parts-Peculiar for Electronic,, Electrical, and Mechanical Equipment.

f. FAA-E-2835, Environmental Remote Monitoring Subsystem (ERMS), April 14, 1989.

g. FAA-G-2100e, Electronic Equipment, General Requirements, March 11, 1987.

h. MIL-STD-1388-1, Logistics Support Analysis.

i. MIL-STD-1388-2, DoD Requirements for a Logistics Support Analysis Record.

j. MIL-STD-1561, Provisioning Procedures.

k. Order 1800.8E, NAS Configuration Management, July 11, 1985.

l. Order 1810.4A, FAA NAS Test and Evaluation Program, February 14, 1989.

m. Order 4800.2B, Utilization and Disposal of Excess and Surplus Personal Property.

n. Order 6000.26A, Reliability and Maintainability Policy, May 14, 1982.

o. Order 6030.45, Facility Reference Data File, March 28, 1974.

p. FAA Standard Drawing, D-5548 ARSR-1, 2, and FPS-60 Radar Radome Mounting Ring Details.

q. FAA Standard Drawing, D-5982 ARSR-3 Tower Fabrication Details.

r. FAA Standard Drawing, D-5983, ARSR-3 Tower Construction Details.

s. FAA Standard Drawing, D-6083, ASR Tower Electrical Details.

t. FAA Standard Drawing, D-6084, ASR Tower Fabrication Details.

u. NAS-DD-1000B, Level I Design Document, May 1986.

v. NAS-MD-110, Test and Evaluation (T&E) Terms and Definitions for the National Airspace System, March 27, 1987.

58.-59. RESERVED.

CHAPTER 6. PROJECT FUNDING

60. PROJECT FUNDING STATUS, GENERAL. Project funding has been provided through FY-91. The current contract for twenty-five systems is estimated for award October 1991. Outyear requirements will be determined by the urgency of the requirement and the availability of funds.

61.-69. RESERVED.

CHAPTER 7. DEPLOYMENT

70. GENERAL DEPLOYMENT ASPECTS. Deployment of FGAR systems is scheduled by the FAA program office and the FAA regions. The FGAR is shipped by the contractor to the site where it is installed. Installation of the equipment is the responsibility of the turnkey contractor and the regions. Table 7-1 depicts the FGAR Deployment Readiness Review (DRR) Schedule.

TABLE 7-1. FGAR DRR SCHEDULE

Event	Estimated Dates
Delivery to T&E Site	9 mo after contract award
Shakedown Testing Complete	10 mo after contract award
Final Rpt. to Assoc. Admin.	10 mo 7 days after contract award
Excom Meeting	10 mo 14 days after contract award

71. SITE PREPARATION. The regions are responsible for preparing the sites where FGAR equipment will be installed. Site preparation includes planning for installation and strengthening towers that have been identified as requiring tower retrofit modifications. The program office will identify each tower that requires modification and will provide guidelines and funds to the respective region in order to accomplish these changes in advance of the FGAR turnkey project. Considerations for site preparation include weather conditions and concurrent construction activities. A regional onsite technical coordinator will be assigned to assure a smooth transition.

72. DELIVERY. FGAR systems will be shipped to the sites in accordance to a delivery schedule that is under the constraints of fiscal year funding. The contractor ships equipment to the regions in accordance with the quantities called out in the contract. Projected delivery dates are contained in chapter 4. Implementation of the project is estimated to be completed in December 1994 provided funding, weather and contract award does not cause appreciable delays.

73. INSTALLATION PLAN. The radome turnkey contractor through the FAA Contracting Technical Officer shall coordinate the receipt, installation, and evaluation of all equipment required to form the FGAR system. The FGAR shall be installed in accordance with national standard drawings and standards revised to fit the individual site. The regional office shall be given the responsibility to coordinate the complete installation, alignment, and operational tests on all identified FGAR interfaces to assure full compliance with FAA specifications and performance. The contractor shall provide engineering support services for onsite advice, including technical guidance to FAA technicians and the installation contractors concerning the proper interfacing of the ERMS to the FGAR when required. Performance analysis and evaluation reports shall be forwarded to the FAA regional office for acceptance. The required time to remove and replace each radome followed by an acceptance test will vary with the type of location, the existing prevailing climatic conditions, and the type of radome (rigid or inflatable). Our best estimate is an average of 15 working days.

74. CONFIGURATION MANAGEMENT (CM) PLAN. CM is the process used to identify and document the functional and physical characteristics of a configuration item, control changes to those characteristics, and record and report change processing and implementation status. Configuration items of concern for this implementation are the materials that are contained in the radome and whether they have any effect on the radome electrical properties, structural integrity during extreme weather conditions, and life span. The CM discipline shall be applied to all configuration items included in the FGAR baselines to ensure compatibility between elements within the FGAR. All additions and changes to the FGAR baselines shall be proposed in the form of a case file, and shall be reviewed for recommended approval or disapproval by a Configuration Control Board (CCB). All changes to the NAS site design baseline, the Fixed Ground Antenna Radome must be processed and approved by the ANR-100 CCB.

a. Acquisition Phase Configuration Management. The Surveillance Engineering Division (ANR-100) CCB controls the establishment of and changes to the FGAR baselines during the acquisition phase. For FGAR matters, the ANR-100 CCB will include members from National Airway Engineering Field Support Sector, ASM-600, Automation Division, ASE-100, Communications/ Navigation/Surveillance Division, ACN-200, Air Transportation Division, AFS-200, and the Configuration Management and System Design (AAF-4). The ANR-100 CCB is responsible for ensuring that the functional, performance, and interface requirements allocated

to the FGAR hardware subsystems are reflected in the baselines, and in any changes to those baselines until product acceptance. The ANR-100 CCB is also responsible for ensuring that baseline documentation is accurate and reflects FGAR operational requirements. CM responsibilities associated with FGAR occurs at acceptance by the ANR-100 CCB designated representative of the contractor's delivered, installed, integrated, and tested hardware product. Hardware product acceptance is based on successful operational readiness demonstration (ORD) of the complete FGAR system. ASM-600 will be invited to participate in a joint "shakedown" test at the T&E site in order to conserve project funds and preclude duplication of effort. At product acceptance, the change control functions and CCB records associated with hardware products that effect Level III drawings and instruction books transition from the ANR-100 CCB to the Maintenance Engineering (ASM-600) CCB.

b. Operational Support Phase Configuration Management. During the operational support phase, and for the entire life-cycle of the implemented hardware enhancements, CM functions will consist of maintenance and change control management of site as well as product baseline (Level III Design). The ASM-600 CCB assumes baseline and change control management of the Fixed Ground Antenna Radome and Environmental Remote Monitoring Subsystem Interface hardware products and associated peripherals as each product is commissioned for operational service by the use of Memorandum of Agreement (MOA), and of related NAS site design baselines. The ASM-600 CCB is responsible for change control management of the FGAR hardware product baseline by MOA. Hardware product baselines are maintained by National Airway Engineering Field Support (ASM-600) personnel in the field. The contractor shall provide engineering changes to ASM-600 when the changes are released, and prior to field implementation. ASM-600 shall evaluate the changes and approve the change for field implementation via a case file. The CM functions assigned to the ASM-600 CCB are described in the ASM-600 CCB charter.

75.-79. RESERVED.

CHAPTER 8. VERIFICATION

80. FACTORY VERIFICATION. The contractor performs a series of tests in accordance with the requirements of the contract, the equipment specification, FAA-G-2100e, Electronic Equipment, General Requirements, and other documents prior to acceptance of the equipment by the FAA's contracting officer. These tests, design qualification tests, type tests, and production tests will demonstrate that all hardware, software, and all performance requirements are met before the FAA accepts a FGAR system from the contractor.

81. CHECKOUT. After installation of equipment by the regions, FAA personnel conduct checkout tests in accordance with the contractor developed equipment instruction books. The procedures followed include testing electrical and mechanical hardware interfaces, verifying system performance, testing interfaces through diagnostics, and verifying maintenance capability and adequacy of support hardware and software.

82. CONTRACTOR INTEGRATION TESTING. The contractor shall provide an Onsite Acceptance Test Plan to the Government to verify compliance of the radome, site spares, support equipment, and documentation with the requirements in FAA-E-2773 and respective statement of work for onsite acceptance testing. The contractor shall conduct the on-site acceptance tests in accordance with the approved plan.

83. CONTRACTOR ACCEPTANCE INSPECTION (CAI). The CAI is the final acceptance of the turnkey installation by the Government from the contractor. The CAI will be conducted by the regional Technical On-Site Representative (TOR), who represents the contracting officer. The contractor shall notify the TOR fifteen (15) days prior to the time the contractor is ready to participate in the CAI.

84. FAA INTEGRATION TESTING. These tests are conducted to verify that the FGAR system has been integrated as specified and that it can interface with the specified external systems. Included are tests that verify the operation of multiple interfaces and integration with other systems in the operational environment. At this point in time, the FGAR system should have been adapted to parameters of the operational equipment with which it must interface.

85. SHAKEDOWN AND CHANGEOVER. System shakedown is the critical period of testing that is performed after the FAA takes full responsibility for equipment/systems and software. Evaluations

to determine the adequacy and acceptability of procedures and operations to demonstrate an initial operating capability (IOC) shall be accomplished prior to system shakedown. System shakedown ends when JAI activities begin. During system shakedown, operational requirements are tested and the equipment is tested from the maintainability standpoint. System shakedown permits facility personnel to become familiar with the system, learn its limitations, and to become proficient in diagnosing problems and effecting repairs. Shakedown activities include accomplishment of the following activities:

a. Operational and maintenance proficiency and hands-on training.

b. Evaluations to determine the adequacy of system failure detection and recovery procedures.

c. Live testing of operational functions, including specific adaption data, and system configuration.

d. Evaluations to determine the suitability of displayed operational data.

86. JOINT ACCEPTANCE INSPECTION (JAI). A JAI is conducted in accordance with Order 6030.45, Facility Reference Data File, to gain the consensus of involved offices that the FGAR project has been completed in accordance with applicable standards and specifications and that the facilities are capable of providing the services required within established standards and tolerances. The JAI ensures compliance with requirements in the following areas:

a. Facility construction and equipment installation.

b. Facility/system/equipment performance.

c. Facility technical performance documentation and maintenance reference data.

d. Facility logistics support.

e. Final acceptance and commissioning.

87.-89. RESERVED.

CHAPTER 9. INTEGRATED LOGISTICS SUPPORT

90. MAINTENANCE CONCEPT. The maintenance concept for the FGAR. System shall consist of both site and FAA Logistics Center repair. Maintenance technicians (either FAA and/or contractor) will replace FGAR components down to the line replaceable units (LRU) and may perform limited repair/corrective and preventative maintenance functions as required, onsite. FAA Logistics Center maintenance will consist of receipt and repair/replacement of failed LRU's as applicable to the particular installation. These functions can be performed by either the FAA and/or a commercial contractor. The extent of contractor/depot maintenance will be defined by the contractor's utilization of the Logistics Support Analysis (LSA) Program in accordance with MIL-STD-1388-1/2, to define LRU's and proposed repairable LRU's that will then be supported in the supply system based on the development of the LSA master files.

91. TRAINING. If required, the training program for the FGAR system will be contained in the FGAR Subsystem Training Plan. Assignment of training quotas for the regions will be made by ASM-210 for Airway Facilities personnel. Projected training requirements by individual work centers/facilities and principal training milestones are included in this training plan. Initial training of FAA AF personnel will be conducted by the contractor at the contractor's facility. Training courses are developed and conducted for those technicians who perform maintenance on long-range radars and FAA Academy personnel who will be generating FAA Academy resident training courses. Training course graduates will be able to configure the FGAR system for normal operation and system testing using manufacturers instructions and FAA Handbook Specifications. They will possess sufficient knowledge to troubleshoot and repair to LRU level as applicable to the particular installation and to perform and document all periodic maintenance.

92. SUPPORT TOOLS AND TEST EQUIPMENT. The contractor will provide a listing of support and standard test equipment required to maintain the system.

93. SUPPLY SUPPORT. The contractor will identify spare parts and consumables necessary for maintaining the FGAR readiness and FGAR component repair in accordance with the LSA Program. Supply support procurement actions will be initiated prior to the installation and checkout phase by the provisioning officer at the FAA Logistics Center.

94. VENDOR DATA AND TECHNICAL MANUALS. Technical manuals will be obtained in accordance with FAA-D-2494b. Engineering drawings will be prepared in accordance with DOD-D-1000 and DOD-STD-100. Course materials will be developed in accordance with FAA-STD-028. Parts lists in hard copy used for provisioning will be formatted in accordance with FAA-G-1375c for spare parts peculiar and MIL-STD-1561 for all other lists.

95. EQUIPMENT REMOVAL. All systems installed under this establishment program require removal of the existing radome with the exception of the BOS's which presently do not have existing radomes. Systems installed under the FGAR program may require removing existing hardware with either rigid or inflatable structure hardware and modifications to accommodate the new radome type. FAA Order 4800.2B, Utilization and Disposal of Excess and Surplus Personal Property, contains policy details.

96. FACILITIES. Not applicable.

97. EQUIPMENT NOT FURNISHED. Not applicable.

98.-99. RESERVED.